



# MK 14 MOD 2 MIL-STD 1913 PATTERN SCOPE RAIL TEST REPORT

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## **1.0 Introduction**

This test report provides results of the evaluation of prototype / initial production sample MIL-STD 1913 Pattern Scope Rails for use on the MK 14 MOD 2 Rifle.

### **1.1 Background**

The MK 14 MOD 2 is a Designated Marksman Rifle which is derived from the M14 Sniper Security Rifle (SSR). This rifle had been issued with multiple scope rail configurations which were all based on the Leupold Pattern Rail with only 4 total recoil lug cross slots. While the Night Force ULT Scope Rings used are suitable for both the Leupold and MIL-STD 1913 Type Rails, the 1913 Type has a continuous cross slot pattern allowing for the most versatility with respect to scope ring mounting locations. Use of the new rail also allows for mounting compatibility with other currently available fire control / optical devices. The new MIL-STD 1913 Pattern Scope Rail is intended for a direct replacement of the current issue Leupold Pattern Scope Rails. The scope rail upgrade effort was funded by NAVSEA PMS 340 in support of NECC (Naval Expeditionary Combat Command).

### **1.2 Objective(s)**

This testing was intended to verify the final design and manufacture of the MIL-STD 1913 Pattern Scope Rail for use on the MK 14 MOD 2 Rifle. The drawing may still be modified before being approved with production then commencing.

### **1.3 Scope**

This testing applied only to the fit and function of the MIL-STD 1913 Pattern Scope Rail for use on the MK 14 MOD 2 Rifle.

### **1.4 References**

Drawing 7017012 (Draft)	Rail, Scope, MIL-STD 1913 Pattern
SW370-CU-OPI-010	MK 14 MOD 2 Operators Manual

### **1.5 Description**

The MIL-STD 1913 Pattern Scope Rail is a solid steel part with two threaded interfaces at the rear on the sides for attachment to the M14 receiver rear sight support "ears" and a single through hole on the top at the front for securing via machine screw to the Front Ring (common to both rail configurations).

## 2.0 Measurements and Fit Testing Results

The table in Appendix A was used to document and compare selected dimensions from the 5 initial production samples to those of the current drawing. All dimensions were within the desired tolerances based on precision of measurement capability used. The Mitutoyo digital calipers used were compared to calibrated standards sized at: inside 1.5865", 3.5962", 5.5958"; outside 1.000", 4.000", 6.000". The calipers used proved accurate to their maximum resolution of 0.0005". All 5 Scope Mounts were installed on both of the two test rifles to confirm proper fit, and then two of them were chosen randomly for use in the live fire evaluation. During this evaluation the Scope Rails were found, due to design, to interfere with the top dovetail receiver area intended for interface with the M14 stripper clip guide. Interference was minimal and did allow for fit confirmation with respect to the 3 attachment screw holes. The two mounts which were properly installed for live fire testing were relieved in the interference area by filing for clearance. The 8-32 UNC Low Head Cap Screw design hex socket cannot tolerate as much torque as that of the original rail screw. This screw requires the use of the recommended 20 in-lbs of installation torque with its small 5/64 hex bit interface.



**Arrow above denotes location of minor Scope Rail to Receiver Interference**

## 3.0 Live Fire Testing

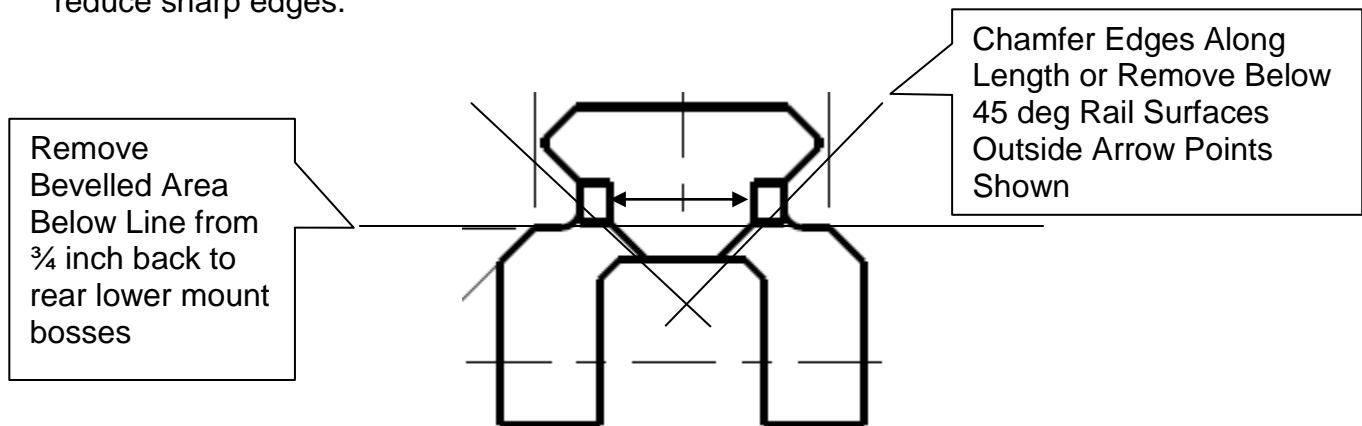
Two MK 14 MOD 2 rifles which were already qualified for precision capability, were reconfigured with two of the initial production MIL-STD 1913 Pattern Scope Rails per the instructions in SW370-CU-OPI-010 (front screw installation torque has been revised to be 20 inch-lbs). Rifles with Scope Rails installed were test fired to confirm no negative impacts to grouping/precision potential at 100 yards or to weapon ejection pattern in the Code JXN Underground Test Range. The required precision potential for the system is 5 shots within 1.5 inches at 100 yards. Each rifle was fired for 10 sighting shots and 3 documented groups of 5 shots each at 100 yards (to include at least one qualifying group) followed by 15 additional rounds each for function. Both rifles were fired for a total of 40 shots each without any negative effects due to the new Scope Rail configuration. Ejection patterns were normal with no malfunctions.

### Live Fire Precision Results

	Rifle SN 1110672	Scope SN R00557	Rifle SN 1277570	Scope SN P06589
Group #	Extreme Spread		Extreme Spread	
1	1.8 inches		0.7 inches	
2	1.3 inches		1.4 inches	
3	1.7 inches		1.2 inches	
Ammunition: MK 316 MOD 0 / NALC AB39: Lot FC-09C750-011				

#### 4.0 Analysis and Evaluation

The key features of the MIL-STD 1913 Scope Rail were confirmed suitable for production and subsequent use on new and already fielded MK 14 MOD 2 Rifles. However, some adjustment of the strengthening rib along the bottom is in order. These changes would both eliminate receiver interference as well as streamline the design and reduce sharp edges.



#### 5.0 Conclusions

The Rail Interfaces with the M14 Receiver in the same manner as the original design rails which is what was desired. The minor fitment required to eliminate receiver interference along the open span of the rail was due to the lack of a tolerance / fit study. This was not considered since the original mount rail did not have this interference issue. The interference was easily eliminated in support of testing. The current design is slightly heavier than necessary and could have a couple sharp edges eliminated.

## 6.0 Recommendations

It is recommended that the rail design receive a few minor alterations with focus on reduction of the strengthening rib thickness and width. This will eliminate interference, reduce weight and minimize sharp edges. The 0.617 – 0.010” dimension (#10 in App. A table) is based on the MIL-STD 1913 below rail clearance/ undercut requirement and is only needed at the rear mounting boss area and not along the open span where extra clearance beneath the actual interface area of the rail is fine. The initial production sample rails meet the current drawing specifications. Once the rail design is modified, at a minimum to eliminate receiver interference, production should be authorized.

**Appendix A –**

Sample Rail Dimensions					
# Drawing Dim.\Sample (7017012)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1. Rail Overall Width 0.830 + 0.005"	0.832	0.831	0.831	0.830	0.831
2. Recoil Slot Width 0.206 + 0.008"	0.209 0.210 0.212	0.211 0.209 0.210	0.210 0.209 0.210	0.210 0.211 0.209	0.209 0.210 0.211
3. Recoil Slot Depth 0.118 + 0.008"	0.123 0.120 0.123	0.122 0.124 0.123	0.123 0.122 0.123	0.122 0.121 0.122	0.122 0.122 0.122
4. Height at Rear 0.965 + 0.003"	0.968	0.967	0.967	0.968	0.967
5. Width at Rear 1.100 +/- 0.005"	1.100	1.099	1.100	1.099	1.100
6. Distance between front and rear holes 5.531 +/- 0.005"	Fit Checked	Fit Checked	Fit Checked	Fit Checked	Fit Checked
7. Overall Length 6.255 +/- 0.005"	6.250	6.250	6.253	6.251	6.257
8. Rear Threaded Hole Location up 0.188" and right 0.375 inches from lower left corner of mount	Fit Checked	Fit Checked	Fit Checked	Fit Checked	Fit Checked
9. Height at Front 0.465 +/- 0.005"	0.468	0.468	0.469	0.469	0.466
10. Undercut below rail width 0.617 – 0.010"	0.610	0.608	0.608	0.609	0.607

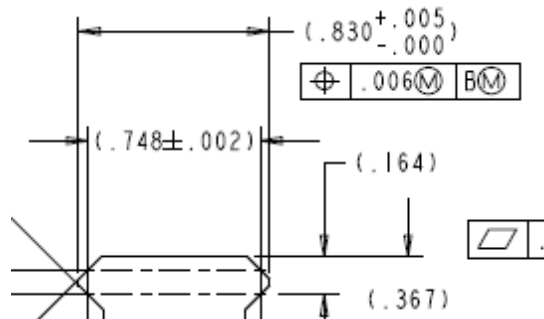
Note: See # reference on next 2 pages for details on each dimensional reference.



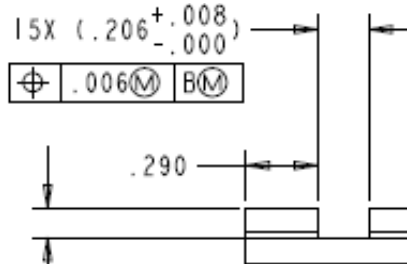
**Appendix A –**

Scope Rail Dimensions Check Reference: (std tolerance if not noted is +/- 0.005 in.)

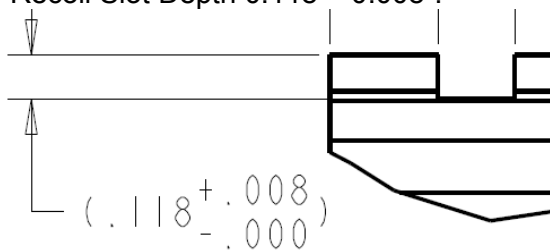
1. Rail Overall Width 0.830 + 0.005”:



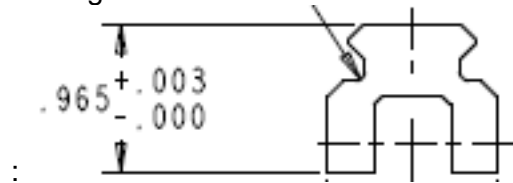
2. Recoil Slot Width 0.206 + 0.008”:



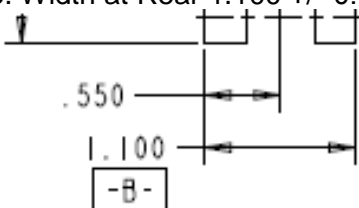
3. Recoil Slot Depth 0.118 + 0.008”:



4. Height at Rear 0.965 + 0.003”

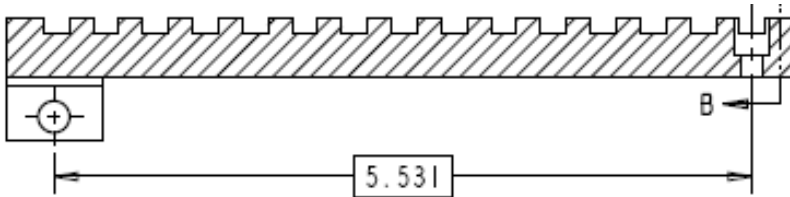


5. Width at Rear 1.100 +/- 0.005”

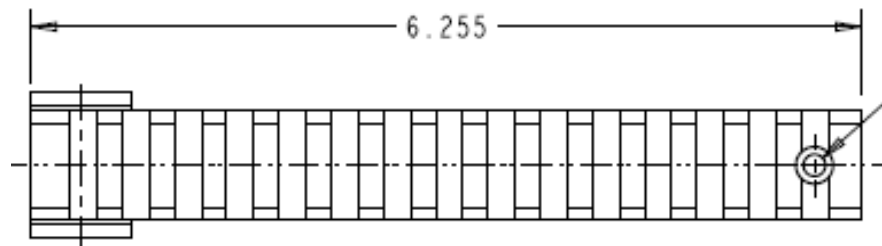


**Appendix A –**

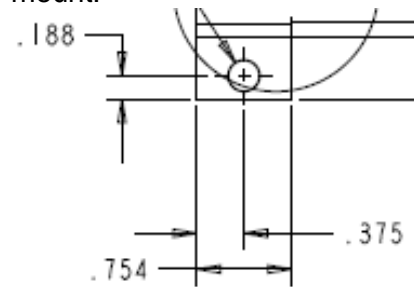
6. Distance between front and rear holes  $5.531 \pm 0.005$ "



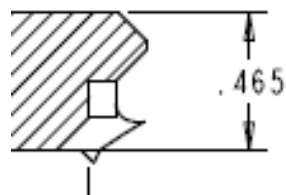
7. Overall Length  $6.255 \pm 0.005$ ":



8. Rear Threaded Hole Location up  $0.188$ " and right  $0.375$  inches from lower left corner of mount:



9. Height at Front  $0.465 \pm 0.005$ ":



10. Undercut below rail width  $0.617 - 0.010$ ":

